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COMPLETE SPECIFICATION

DRAWINGS ATTACHED

A Method and Apparatus for Manufacturing Tampons, particularly for Feminine Hygiene

We, DR. CARL HAHN K.G., a German Company of Heinrich-Heine-Allee 53, Dusseldorf, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a method and apparatus for manufacturing tampons, particularly for feminine hygiene, by a radial pressing of generally cylindrical blanks, consisting typically of a rolled-up cotton-wool fleece, by means of apparatus comprising at least four pressing jaws arranged to be movable radially with respect to a central axis, these pressing jaws being provided alternately, in the circumferential direction, with pressing edges and with part-cylindrical pressing surfaces.

It is an object of the invention so to improve apparatus of this known kind, and the method of using it, that the tampons manufactured therewith exhibit, as mass-produced branded articles, the high and, so far as possible, uniform stability which constitutes a necessary requirement for the reliable introduction of a tampon into a body cavity.

For the attainment of this object, there is provided according to the invention a method of making a tampon from a generally cylindrical blank by means of pressing apparatus comprising at least four pressing jaws movable radially with respect to a central axis, the jaws including jaws of a first kind each formed with a pressing edge parallel with the said central axis and projecting towards the said central axis and, disposed alternately between the jaws of the first kind, jaws of a second kind each formed with a pressing surface which is concave towards

the said central axis and part-cylindrical about a respective cylinder axis parallel to the said central axis, the method comprising the steps of inserting between the jaws, while these are retracted away from the central axis, a generally cylindrical tampon blank, advancing all the jaws simultaneously towards the central axis until they are all spaced equally from the central axis by a distance approximately equal to the radius of the blank, thereafter advancing the jaws of the first kind until the pressing edges thereof are spaced from the central axis each by a distance equal to the intended final radius of the tampon, and finally advancing the jaws of the second kind until they too are spaced from the central axis by a distance equal to the intended final radius of the tampon.

Equally, the invention provides apparatus for making a tampon from a generally cylindrical blank, comprising at least four pressing jaws, of two kinds, movable radially with respect to a central axis, the jaws of the first kind being formed each with a pressing edge parallel with the central axis and projecting towards the central axis and having disposed alternately between them the jaws of the second kind, which latter jaws are each formed with a pressing surface which is concave towards the central axis and which is part-cylindrical about a respective cylinder axis parallel to the central axis, the apparatus further comprising actuating means for advancing the jaws towards the central axis, wherein the actuating means is arranged to advance all the jaws simultaneously until they are all spaced equally from the central axis by a distance corresponding approximately to the radius of a cylindrical blank which they are to press into a tampon, thereafter to advance only the jaws of the first kind until

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they are spaced from the central axis by a distance equal to the intended final radius of the tampon, and finally to advance the jaws of the second kind until they too are spaced from the central axis by a distance equal to the intended final radius of the tampon.

The invention is based upon the discovery that, by virtue of the initial simultaneous closing movement of all the pressing jaws approximately as far as the diameter of the tampon blank, the blank is more exactly centred than hitherto between the pressing jaws, with its longitudinal axis more precisely co-incident with the said central axis, whereby is avoided a more severe gripping of the underside of the blank by those jaws which support its weight than of the upper part of the blank by the remaining jaws. The improved radial symmetry with which the pressing jaws initially engage and centre the blank results, in the subsequent pressing first by the jaws of the first kind and then by the jaws of the second kind, in an improved radial symmetry of the compression which takes place; and in the final tampon the compression is greatest, and thus also the strength and rigidity of the tampon, along its central longitudinal axis and not on a line parallel thereto but displaced towards its periphery as is the case when the blank is asymmetrically compressed—such asymmetrically compressed tampons being liable to buckle when used, so that manipulation becomes difficult, if not impossible.

The invention is illustrated by way of example in the accompanying drawing in which:—

Figure 1 shows diagrammatically the pressing jaws of apparatus according to the invention after the completion of the simultaneous initial movement of all the jaws approximately as far as the diameter of a tampon blank;

Figure 2 shows diagrammatically the pressing jaws of the first kind just before the end of their subsequent closing movement of the tampon, with simultaneous commencement of the closing movement of the pressing jaws of the second kind; and

Figure 3 shows all the pressing jaws in their final position.

The figures illustrate diagrammatically the mould which forms the apparatus for manufacturing tampons for feminine hygiene by a radial pressing of blanks 1 consisting of a coiled cotton-wool fleece. The illustrated mould comprises four pressing jaws 2 of a first kind, each having an edge parallel to a central axis of the mould, which jaws alternate in the peripheral direction of the blank 1 with pressing jaws 3 of a second kind, each having a concave

pressing surface which is part-cylindrical about a cylinder axis parallel to the said central axis.

According to the invention, all the pressing jaws 2 and 3 close first of all, simultaneously and with equal closing velocity, approximately as far as the diameter of the tampon blank 1 and concentric to the central axis, on which axis the longitudinal axis of the blank 1 becomes centred as is illustrated in Figure 1. Then the pressing jaws 2, provided with pressing edges, close as far as the final dimension of the tampon pressing, as shown in Figure 2. Just as, or just before, the pressing jaws 2 have reached their final position, the pressing jaws 3 provided with part-cylindrical pressing surfaces likewise commence the closing process until finally all the jaws are spaced from the central axis by a distance equal to the intended final radius of the tampon. It will be noted that in this final position the cylinder axes of the part-cylindrical surfaces of the jaws 3 coincide with one another and with the central axis of the mould.

The simultaneous initial closure movement of all the pressing jaws should proceed at least as far as the diameter of the tampon blanks, but should preferably proceed further, i.e. to the stage where each jaw is spaced from the central axis by a distance which is slightly less than the radius of the blank, as Figure 1 clearly shows.

The actuating means of the apparatus, whereby the desired movements and sequence of movement of the jaws are effected, is not shown in the drawings, and no detailed description thereof will be required since the provision of suitable actuating means constitutes no problem once its required function has been specified, as is done above.

WHAT WE CLAIM IS:

1. A method of making a tampon from a generally cylindrical blank by means of pressing apparatus comprising at least four pressing jaws movable radially with respect to a central axis, the jaws including jaws of a first kind each formed with a pressing edge parallel with the said central axis and projecting towards the said central axis, and, disposed alternately between the jaws of the first kind, jaws of a second kind each formed with a pressing surface which is concave towards the said central axis and part-cylindrical about a respective cylinder axis parallel to the said central axis, the method comprising the steps of inserting between the jaws, while these are retracted away from the central axis, a generally cylindrical tampon blank, advancing all the jaws simultaneously towards the central axis until they are all spaced equally from the central axis by a distance approxi-

mately equal to the radius of the blank, thereafter advancing the jaws of the first kind until the pressing edges thereof are spaced from the central axis each by a distance equal to the intended final radius of the tampon, and finally advancing the jaws of the second kind until they too are spaced from the central axis by a distance equal to the intended final radius of the tampon.

2. A method as claimed in claim 1, wherein the simultaneous movement of all the jaws together is continued until they are all spaced from the central axis by a distance which is slightly less than the radius of the blank.

3. A method of making a tampon, from a generally cylindrical blank, substantially as described herein with reference to the accompanying drawing.

4. A tampon made by the method claimed in any of claims 1 to 3.

5. Apparatus, for making a tampon from a generally cylindrical blank, comprising at least four pressing jaws, of two kinds, movable radially with respect to a central axis, the jaws of the first kind being formed each with a pressing edge parallel with the central axis and projecting towards the central axis and having disposed alternately between them the jaws of the second kind, which latter jaws are

each formed with a pressing surface which is concave towards the central axis and which is part-cylindrical about a respective cylinder axis parallel to the central axis, the apparatus further comprising actuating means for advancing the jaws towards the central axis, wherein the actuating means is arranged to advance all the jaws simultaneously until they are all spaced equally from the central axis by a distance corresponding approximately to the radius of a cylindrical blank which they are to press into a tampon, thereafter to advance only the jaws of the first kind until they are spaced from the central axis by a distance equal to the intended final radius of the tampon, and finally to advance the jaws of the second kind until they too are spaced from the central axis by a distance equal to the intended final radius of the tampon.

6. Apparatus, for making a tampon from a generally cylindrical blank, substantially as described herein with reference to the accompanying drawing.

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